

and made it so slide upon the snow in the field, which was hard and crusted by reason of the frost overnight, that thereby I might see very well the whole nature of the wind as it blew that day. And I had a great delight and pleasure to mark it, which maketh me now far better to remember it. Sometime the wind would be not past two yards broad, and so it would carry the snow as far as I could see. Another time the snow would blow over half the field at once. Sometime the snow would tumble softly, bye and bye it would fly wonderful fast. And this I perceived also, that the wind goeth by streams and not whole together. For I should see one stream within a score on me; then the space of two score, no snow would stir, but after so much quantity of ground, another stream of snow, at the same very time, should be carried likewise, but not equally, for the one would stand still, when the other flew apace, and so continue, sometime swifter, sometime slower, sometime broader, sometime narrower, as far as I could see. Nor it flew not straight, but sometime it crooked this way, sometime that way, and sometime it ran round about in a compass. And sometime the snow would be lift clean from the ground up to the air, and bye and bye it would be all clapt to the ground, as though there had been no wind at all; straightway it would rise and fly again. And that which was the most marvel of all, at one time two drifts of snow flew, the one out of the west into the east, the other out of the north into the east. And I saw two winds, by reason of the snow, the one cross over the other, as it had been two highways. And again, I should hear the wind blow in the air, when nothing was stirred at the ground. And when all was still where I rode, not very far from me more marvel at the nature of the wind than it made me cunning in the knowledge of the wind; but yet thereby I learned perfectly that it is no marvel at all, though men in wind lose their strength in shooting, seeing so many ways the wind is so variable in blowing.—*Aeronautics*, London, Dec. 11, 1919, p. 525.

#### SPEED OF UPPER WINDS.

[Reprinted from *Aeronautics* (London), Jan. 15, 1920, p. 68.]

The pilot balloons which are sent up daily to record the movements of the atmosphere at various altitudes showed on January 9 that, in the upper air, the wind was traveling southeast at a phenomenal speed. At 16,000 feet its velocity was from 70 to 80 miles an hour; at 26,000 feet the wind was moving at the astonishing speed of 180 miles an hour. The Airco service at a comparatively low altitude found that, even over the Channel, where as a rule the winds are strongest, the velocity was not more than from 40 to 50 miles an hour.

#### SOUTHERN HEMISPHERE DECADAL AND MEAN MONTHLY ANNUAL RAINFALL.<sup>1</sup>

By R. C. MOSSMAN.

[Abstract.]

In studies relating to agriculture it is often desirable to compare the seasonal or monthly rainfall distribution

in different regions so as to be able to form some idea of the suitability of a given locality for the cultivation of a crop not hitherto grown in that district, due regard, of course, given to such factors as temperature, sunshine, soil, and exposure. Comparisons of this nature are often affected by taking such monthly or annual normals as are available, without reference either to the length of the period embraced by the records, or the synchronism of the data. \* \* \*. As a first step toward uniformity in the matter of Southern Hemisphere rainfall, the decadal and, generally, monthly and annual means given in the tables appended [not reprinted here] have been computed. The records are mainly from the western seaboard of South America, New Zealand, and Australia. It is hoped from the large mass of temperature, pressure, and other data available to compute decadal means for the other elements of climate, since even a superficial examination of the rainfall normals here given shows several directions in which interesting research could in this way be undertaken.—*H. L.*

#### A NEW METHOD FOR DETERMINING TOTAL RAINFALL ON THE OCEANS.

By FRITZ VON KERNER.

[Abstracted from *Meteorologische Zeitschrift*, May-June, 1919, pp. 167-168.]

Investigations by Schmidt and Lütgens on the total rainfall over the oceans have given quite discordant results (242,000 and 475,000 km.<sup>3</sup>), while Brückner's value (360,000 km.<sup>3</sup>) is about the average of the first two. These investigations were made upon the study of evaporation. The present investigation, however, used as its basis, the known rainfall data for the Indian Ocean and the North Atlantic. These were arranged according to latitude, together with the surface salinity of the ocean. By rearranging the data, the rainfall values were plotted against the surface salinity of the ocean. Knowing the salinity of the surface of other oceans, it is reasonable to assume that the relation between salt content and rainfall hold there also, thus giving a basis for computing the total rainfall for the entire water area. A careful computation yields for the annual rainfall over the water surface of the earth, a value of 360,500 cubic kilometers, which is in very good agreement with the value determined by Brückner upon the basis of evaporation.—*C. L. M.*

#### JAPANESE BUSINESS MEN BUILD MARINE METEOROLOGICAL OBSERVATORY.

The construction of a marine meteorological observatory which is now going on at Kobe is expected to be completed and opened to service in March. The building of the observatory owes its origin to the contribution by Kobe business men of 230,000 yen for the purpose, and an estimate of 150,000 yen will be introduced in the forthcoming session of the Diet for wireless installation. [An additional 400,000 yen may be appropriated to extend the sending radius to ships as far as Hongkong].—*U. S. Naval attaché at Tokyo.*

<sup>1</sup> Quart. Journ. Roy. Meteorological Soc., Oct., 1919, vol. 45, pp. 355-386.